Accelerator Systems Division Highlights Ending July 15, 2005

Installation

Craft Snapshot 7/1205

ASD productive craft workers	**60.0**
Foremen (Pd by 15% OH)	7.0
AMSI management (Pd directly)	3.0
TOTAL AMSI WORKERS	70.0
Less WBS 1.9, 1.2 etc	**13.0**
Less absent	**3.0**
TOTAL PD BY ASD/ORNL DB WPs	**56.0**

Accelerator Physics

- In preparation for SCL commissioning the Beam Commissioning Plan and the Beam Commissioning Fault Study Plan have been completed.
- In support of the fault study plan, Y. Zhang completed an analysis of beam tuning faults and their loss profiles. From this study we conclude that the most localized loss in the linac occurs for a low-energy beam transported in the high energy (1 GeV) lattice. In this case the beam can be lost over about 5 meters. For a 1 GeV beam, the most localized loss is about 20 meters.
- Testing of the Energy Management Program is proceeding. This application takes as input the SC cavity gradient limits (which may include zero for cavities that are off) and provides a properly matched lattice. Several current to magnetic field issues in the quadrupoles have been uncovered and corrected.
- A renewal proposal and presentation for the laser-stripping LDRD project were completed and delivered.

Operations

ASD Operations played the role in the Accelerator Readiness Review of Commissioning of CCL4 and the Superconducting Linac. This review was highly successful. It resulted in 26 Pre-Start Action Items which we expect to close by July 26. We have planned for a closeout video conference on July 27 with the ARR committee and expect to receive permission to begin commissioning from DOE shortly thereafter. Congratulations to the entire SNS Internal ARR Team.

Ion Source

- Last January we were sometimes unable to provide a voltage with steerer B. The problem, however, went away. The steerer worked fine for the last several weeks until the afternoon we wanted to prepare the source for beam. After extended trouble shooting Alan Justice located the problem in the cable that connects the group 3 unit with the high voltage supply.
- 30 minutes of full duty cycle conditioning followed by 15 minutes of cesiation brought 30 mA measured with BCM02. The pulse was squared down to ~20 mA by mismatching the 2 MHz matching network.

Survey and Alignment

Monday 11 July, 2005, S & A began an alignment verification campaign through the entire Linac Tunnel. This campaign is progressing well land should be completed by Monday, 18 July.

Mechanical

Magnets

- All 21Q40 Quads have been measured. A 21Q assembly is ready for alignment. There are four more 21Q40 assemblies yet to go.
- We are setting up the 30Q44/58 measurement system.

Water Systems Installation

- Installation and leak testing was completed for the all main Ring magnets.
- Repair of an interconnecting buss on one of the Ring injection kicker magnets was started.
- Installation and leak testing was completed for all the Ring Dipole magnets' buss & interconnections.
- Installation of the RTBT 21Q40 magnets' cooling connections continued.
- The Ring Service Building Power Supply cooling skid was put into operation and the header system leak tested.
- Preventative Maintenance on the Linac water systems continued.

Ring Systems Installation

- The HEBT Collimators' cooling system pneumatic control lines' installation was completed.
- The HEBT beamline between magnet QH10 and QV11 was installed and entire beamline from the SCL to the Linac Dump successfully leak tested and under vacuum.
- The HEBT chicane shield wall construction was 95% completed.
- The HEBT truck entrance stacked shielding was completed.
- The RTBT 21Q40 magnet QH12 was installed.

Electrical

- Prepared Ring Injection Kicker Supplies for power tests. Awaiting water for power supplies.
- Main Ring Dipole Supplies and Quadrupole supply wiring complete. Awaiting safety fencing and water for power supplies.
- All Installed Ring and RTBT magnets have been cabled except for the injection straight. There are 13 magnets not installed.
- AC power for the Diagnostics room is complete. 25% of the BPM cabling has been pulled and 15% of the terminations are complete.

HPRF

Ring RF

- AC wiring complete. Racks need power labeling.
- DC and Control wiring complete.
- Some Cavity/Amplifier grounding remains to be completed.
- Amplifier mounting rails for 1 station are in place and the amplifier is properly located.
- Final amplifier tube ready to be installed in Station 21 which will be the first station operated. Anticipate installing the amplifier tube on Monday. It was scheduled for Thursday but weather interfered with the move from RFTF to the ring tunnel.
- Waiting for AC power.

LLRF

- The problem of spurious faults on High-Power Protection Modules has been traced to signal delays in the FPGA code implementation. These faults have been eliminated by re-synthesizing the FPGA code with tighter timing requirements. The re-synthesized code has been tested in the lab and on several Linac RF systems. All HPMs will be updated next week.
- We continue to study LLRF system performance and to push toward higher gradient operation in the superconducting Linac.
- The plastic optical fiber jumpers have been installed for cryomodules 1-9. The technicians will work this weekend and plan to complete the work on cryomodules 10-18 by Monday evening. The completion of cryomodules 19-22 will be completed thereafter, depending on Linac tunnel accessibility.

Cryo Systems

Controls

- The Controls Team participated in the Accelerator Readiness Review this week. In particular, presentations were given on the PPS and MPS systems. Some minor pre-start requests were made for these controls subsystems – there should be no difficulty completing them in time for the upcoming planned beam run.
- A soft IOC was added to save and check the RF transmitter PLC settings to alert operations of any setup errors during startup procedures. In general, there is no access to correct the values from EPICS, so the PLC screens would have to be used to correct these values. After HPRF personnel have ensured that the saved values are correct, the check will be incorporated into the startup procedures.
- ORNL badge readers are being installed in the Linac and HEBT entry stations. These will replace the proximity card readers that are now in use. Work is also continuing to provide an access control system for the Ring to support magnet testing. The current need date is August 1. Channel access security was added for new PVs in the PPS IOCs.
- Both BECKHOFF analog (new) and digital (existing) in the SCL Vacuum system have been upgraded with the new BECKHOFF driver and are on-line. Three or four channels periodically show off scale on BECKHOFF readings even when the correct output voltage is measured at the JLAB box. These readings have been inconsistent over the past couple of days. Improving the grounding did not help. BECKHOFF technical support has been consulted. A laboratory test bed will be set up. It is estimated that the serial driver will be fully configured early next week.

- Fabricated boards were received for the LEBT Chopper differential receiver board. They have been assembled and are ready for installation next week. The differential Driver and I/O board have been also been assembled and are ready for the next chopper experiments.
- Layout is complete for the new Event Link system with improved jitter performance. The board has been sent for fabrication.
- All MPS PLC requirements, cabling, and software for the HEBT, Ring, and RTBT were reviewed and instructions issued to correct errors (due to not everyone getting the word about everything).
- One member of the SNS Controls Team participated in design discussions held at the APS for the next major release of EPICS – known as "Version 4."
- As we declare readiness for linac operation, the effort is turning to the HEBT and Ring. Larry Hoff visited from BNL and has assisted in establishing the status of ring subsystem control, including vacuum, RF, kickers and motion control (for the strippers.) Temperature control bits were added for the HEBT vacuum. The skid motor starter and I to P converter got wired up. A small design change was implemented to accommodate the motor starter design. A Ring HPRF test plan is being developed.
- Operator screens for power monitoring have been upgraded, as well as the CF OPC configuration file and archive request file.
- Checkout of instruments used for control of the target mercury loop continued and flows were verified. EPICS and PLC support was added for testing the mercury loop pump, and appropriate PV names were added to the archive request file.

Beam Diagnostics

- During final linac system checkout, we discovered sensitivities in the embedded timing receivers that are used in most diagnostic devices. These receivers were successfully tested under controlled conditions, but were found sensitive to signal polarities and data patterns that only existed in recently in the final operating environment. Updated gate array code was deployed and is now supporting Front End restart. Nearly all linac and HEBT systems were updated over the weekend and all system tests will be complete in time to support SCL commissioning.
- Two Ring BPM electronics chassis were updated with the final code from BNL and a preliminary functional test was successful.
- The interface chassis for the RTBT harp is nearly complete.